DOCUMENT RESUME

ED 271 913 EC 190 221

AUTHOR Fewell, Rebecca R.; Sandall, Susan R.
TITLE An Investigation of the Effects of a Parent-Implemented Intervention to Increase the Social-Communicative Behaviors of Prelinguistic Infants with Down Syndrome. Final Report.
INSTITUTION Washington Univ., Seattle.
SPONS AGENCY Special Education Programs (ED/OSERS), Washington, DC.
PUB DATE Aug 85
GRANT G008430029
NOTE 50p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Behavior Change; *Communication Skills; *Downs Syndrome; *Home Instruction; Infants; *Intervention; Parent Child Relationship; *Parent Participation; *Parent Role

ABSTRACT

Two studies investigated the effectiveness of a parent-implemented intervention to teach nine Down Syndrome infants social-communicative behaviors. The intervention took place in the infants' homes and consisted of teaching parents: (1) to recognize social-communicative behaviors; (2) to use specified turn-taking strategies in games and routines; and (3) to implement specified games and routines at home. The experimental design used was a multiple baseline across subjects. A training tape and a written hand-out were made to instruct parents in training procedures. Data were collected by observers during the infants' weekly visits to a university-affiliated, center-based parent-infant program. Data analysis methods included visual inspection of the graphed data. These two studies demonstrated the utility of a parent-implemented interactional approach, and the results showed changes in the behavior of eight of nine parents with corresponding changes in the behavior of seven of the nine infants. A six-page list of references, a parent intervention handout, a Communicative Intention Inventory, and elicitation tasks and coding scheme are appended. (CL)

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ED271913

An Investigation of the Effects of a Parent-Implemented Intervention to Increase the Social-Communicative Behaviors of Prelinguistic Infants with Down Syndrome

September 1, 1984 - August 31, 1985

Final Report

Rebecca R. Fewell PI
Susan R. Sandall
University of Washington

12/3/85 G00843002 9 From 9/1/84 To 8/31/85

EC 190221

A. Abstract

An Investigation of the Effects of a Parent-Implemented Intervention to Increase the Social-Communicative Behaviors of Prelinguistic Infants with Down Syndrome

The study of prelinguistic social-communicative behaviors has become increasingly important in understanding early language acquisition. It is presumed that these behaviors are precursors to mature communicative competence. Educators and researchers who work with handicapped children at risk for communication delays seek teaching strategies that will enhance acquisition and use of these behaviors. Systematic studies of the effects of intensive intervention to promote these social-communicative behaviors are rare. Two studies investigated the effectiveness of a parent- implemented intervention to teach infants to use social-communicative behaviors. The intervention took place in the infants' homes. The intervention consisted of teaching parents: 1) to recognize social-communicative behaviors; 2) to use specified turn-taking strategies in games and routines; and 3) to implement specified games and routines at home. The experimental design used was a multiple baseline across subjects. Subjects were nine developmentally delayed infants and their parents. A training tape and a written hand-out were made to instruct parents in the training procedures. Data were collected by observers during the infants' weekly visits to a university affiliated center-based parent-infant program. Data analysis methods included visual inspection of the graphed data.

Table of Contents

		Page
A.	Abstract	1
B.	Purpose	2
	Project Overview	2
	Background and Review of the Literature	3
C.	Method	13
	Study 1	13
	Study 2	18
D.	Discussion	21
E.	Future Activities	23
Figure 1:	The frequency of requesting and commenting behaviors during baseline, intervention, and follow-up sessions.	
Figure 2:	The percentage of turn-taking episodes initiated by infant during baseline, intervention, and follow-up sessions.	
Table 1:	Response of infants of elicitation tasks during baseline, intervention, and follow-up phases.	
Figure 3:	The frequency of requesting and commenting behaviors during baseline, intervention, and follow-up phases.	
Figure 4:	The frequency of parent imitations of infant during baseline, intervention, and follow-up sessions.	
Appendix A:	Parent Intervention Handout	
Appendix B:	Communicative Intention Inventory	
Appendix C:	Elicitation Tasks and Coding Scheme	

B. Purpose

Project Overview

The purpose of this investigation was to test an intervention for increasing social-communication skills in prelinguistic, handicapped children through naturally-occurring routines which were implemented by parents with their children in their homes. Nine parent-infant pairs who attended an early intervention program served as subjects. At the outset of the study, infants ranged in chronological age from 12 to 25 months. Developmentally, infants demonstrated skills typical of an 8- to 10-month old, such as motor imitation and reaching and grasping. Prior to intervention, infant functioning was assessed on the Ordinal Scales of Psychological Development (Uzgiris & Hunt, 1975). Parent-infant pairs were videotaped in a free-play situation prior to parents' training, and the pairs were observed participating in games/routines in the classroom. Target communication skills were selected based on a review of these observations. Parents were trained in an intervention which they implemented at home. Parents were trained to identify social-communicative behaviors and to use a generalized strategy to increase their child's use of social-communicative behaviors. Parents were introduced to a set of activities and games which provided a structure for the facilitation of the target behavior. These activities and games were observed and coded during the infant's regular classroom sessions. The study design was a multiple baseline across subjects. Data analysis was accomplished by visual inspection of the graphed raw data. The purpose of the investigation was to examine the effectiveness of an intervention strategy which has clinical backing but little empirical support. Specific questions to be addressed included:

1. Was the parent training procedure effective in increasing parent's use of the intervention strategy?
2. Did the parent-implemented intervention produce increases in the social-communicative behaviors of prelinguistic, handicapped children?

Background and Review of the Literature

During the past two decades, intervention programs for handicapped and at-risk infants have increased dramatically. Such programs are based on the tenet that through early intervention, handicapping conditions can be prevented or their impact on the child's development can be lessened (INTER-ACT, 1981). Important developmental skills are acquired during the period of infancy, and patterns of parent-child interaction are established. Many skills, including early social and communication skills, are acquired within the context of these early parent-child interactions. Yet for some handicapped and high-risk infants, these interactions with their parent(s) may be ineffective. Parents and their handicapped infants have often been observed to engage in unsuccessful interactions which may not provide the necessary conditions to exercise or encourage the child's emerging skills. With intervention, however, the parent can learn effective strategies to help the child learn developmentally appropriate skills, and the infant can benefit from these social interactions which can be implemented in the child's natural environment. This study investigated the effectiveness of an individualized parent-implemented intervention upon the social-communication development of infants with Down syndrome or other developmental delays.

Communication Delays in Children with Down Syndrome

It is generally acknowledged that infants with Down syndrome acquire skills more slowly than their normal peers (e.g., Dicks-Mireaux, 1972), and are a likely target group for early intervention. The developmental delays associated with Down syndrome are evident from the early months of life, and are well documented (Carr, 1970; Coleman, 1978; Harris, 1980).

Down syndrome is a combination of physical abnormalities and mental retardation characterized by a genetic defect in chromosome pair 21. The defect is the presence of extra genetic material on chromosome pair 21. Down syndrome is the most frequently identified cause of mental retardation (Adams, Erickson, Layde, & Oakley, 1981), and it occurs equally across all races and levels of society. The crude incidence of Down syndrome is slightly less than 1/1,000 births. In most cases, the child is identified at or very soon after birth.

The developmental delays associated with Down syndrome generally occur across all developmental domains. The delay in speech and language becomes particularly apparent during the second and third years of life as the child is slow in beginning to talk. In a recent longitudinal study of children with Down syndrome from birth to 36 months, Reed, Pueschel, Schnell, and Cronk (1980) found that the average Down syndrome child functions on a cognitive level at the lower end of the mildly retarded range, while language development is more delayed. The children's performance on the expressive and combined scores for language was just below half of the expected age norms. The mean expressive score was 16.6 months, and the mean combined score was 17.6 months at chronological age 36 months. Receptively, subjects performed at half their age level (mean score 18.8 months).

Prior to the comprehension and production of words, the infant acquires important prelinguistic behaviors and uses these to communicate. Infants with Down syndrome are generally also delayed in the acquisition of these prelinguistic behaviors. In a study by Bricker and Carlson (1980), a group of ten infants with Down syndrome showed a lag in the acquisition of certain social-communicative behaviors, relative to a comparison group of normal infants. The pattern of development, however, was similiar in both groups. In a comparative study, Dunst (1980) also found infants with Down syndrome were delayed in the development of prelinguistic communicative behaviors. He reported no differences between a group of infants with Down syndrome and a group of nonretarded infants when matched by sensorimotor level. Messick, Chapman, Brown, and Spitz (1983) reported similar results when a group of children with Down syndrome were matched by sensorimotor level and vocabulary size to a group of normally developing children. While there were no differences between the two groups on frequency and type of communicative behaviors, the children with Down syndrome were chronologically older. Jones (1977) reported differences between infants with Down syndrome and normal infants on early communication skills during spontaneous interactions with their mothers: children with Down syndrome did not establish eye contact with their mothers in conjunction with their communicative vocalizations; they participated in more ritualized nonverbal exchanges than normal infants; and they used more repetitive patterns of vocalizations which appeared to play no role in dialogue exchange. The subjects in this study were matched for overall developmental level.

Descriptive studies of infants with Down syndrome have reported delayed acquisition of both prelinguistic and linguistic behaviors. As noted, Jones (1977) found differences in visual contact, non-communicative patterns, and

turn-taking between Down syndrome and normal infants. The more frequent finding has been a developmental lag.

Effects of intervention. Researchers and educators have documented positive results with early intervention services to infants with Down syndrome and their families. A variety of approaches have been used, including home-based and center-based services, and behavioral and cognitive approaches. Infants with Down syndrome who are enrolled in intervention programs exceed expectations in communication and cognitive skills (Moores, 1973) and in overall development (Clunies-Ross, 1979; Hanson, 1977; Hayden & Haring, 1976; Zausmer, Pueschel, & Shea, 1972). Of particular importance to the proposed research is the failure of these studies from the 1970s to include prelinguistic social-communicative behaviors as specific objectives of intervention.

A recent study by Mahoney and Snow (1984) investigated the effects of early language training with 2- to 3-year-old children with Down syndrome. They also assessed cognitive functioning before and after the intervention. Their results suggested that level of cognitive or sensorimotor functioning is related to spontaneous use of trained language behaviors. Specifically, these authors proposed that preverbal communication should be the focus of language intervention for children at lower levels of sensorimotor functioning.

The Emergence of Social-Communicative Behaviors

In the 1970s, research in the area of child language began to focus on social-communicative behaviors in the prelinguistic child. These are defined as "any nonsymbolic vocal or gestural response used to communicate" (Bricker & Schiefelbusch, 1984, pg. 257). Examples of these behaviors, include: looking, reaching and saying "uh" to indicate "I want up"; or pointing to a spinning top and saying "da" as if to say "Look at that."

Several taxonomies are available for describing the social-communicative behaviors infants use during social interactions (Bates, 1976; Coggins & Carpenter, 1981; Dore, 1975; Greenfield & Smith, 1976; Halliday, 1975). These taxonomies differ in terms of number and breadth of categories, and in the use of operational definitions. A core of behaviors are common. These are: requesting, commenting, answering, protesting, and acknowledging. Whether or not these gestural and gestural/vocal behaviors are prerequisite to later verbal communication has not been definitely established. We do know that there is a sequence of progressively more sophisticated levels of communication. The behaviors themselves are functional. The sequence serves to identify the types and modes of behaviors that should be targets of intervention for children at a particular stage of communicative competence.

Bates, Camaioni, and Volterra (1975) followed three youngsters through the sensorimotor period and reported in detail on their communicative acts. Initially, the infants produced signals which their caregivers responded to as meaningful. Then, the infants used action schemes to obtain an object or to make contact with an adult. Gradually, the infants learned to use more complex means to communicate, and to understand that the adult can serve as an agent to obtain an object or end. At first, children's purposeful communicative behaviors were gestural, and later, vocalizations were added. This process is continuous with the onset of language and conventional social-communication (Bates, 1976; Sugarman, 1978).

The context of early communication behaviors. The acquisition of these communicative behaviors appears to be a product of the dynamic social interactions between a child and competent speakers in the environment. Caregivers, usually mothers, and their babies engage in multiple exchanges during the naturally occurring games and routines of caring for an infant. A

variety of researchers have investigated the nature and impact of child-caregiver interactions on the development of early communication (Chapman, 1981; Nelson, 1978; Osofsky & Connors, 1979; Sugarman, 1978). According to Bruner (1977), elaborative play is a major feature of early mother-infant interaction. Routines and games in which many mothers and their infants naturally engage, such as peek-a-boo and point and name, are key teaching strategies.

A mother and her 3-month-old infant may average 6 games per day, and at 6 months the number of games may increase to 13 per day (Snow, 1981). Game playing increases both in number of episodes and types of games over the next 6 months (Gustafson, Green, & West, 1979). These routines and games involve turn-taking, and they provide a predictable structure in which the infant learns to participate. They provide multiple opportunities for the infant to practice emerging behaviors. Through this play, shared meaning develops between the parent and infant. Within this context, the infant learns that others will respond to his or her signals. Over time, the infant becomes more adept and uses conventional signals. The infant practices these prelinguistic skills within these ongoing interactions with the mother and significant others. Through these naturally occurring encounters, infants learn the communication process.

Mother-infant interaction with handicapped infants. When one or both partners in the interchange is not responding in a predictable or readable manner, the interactions may be disrupted. Handicapped infants may produce signals which are infrequent and/or difficult to read. Emde, Katz, and Thorpe (1978) studied the smiling responses of infants with Down syndrome and found these infants had a narrower range of expression and were less likely to elicit social responses than normal infants. Buckhalt, Rutherford, and

Goldberg (1978) observed mother-infant dyads involving 12- and 13-month-old infants with and without Down syndrome. They found the infants with Down syndrome had fewer smiles and vocalizations, and their interactions with their mothers were asynchronous. These results were similiar to those of Jones (1977), who found that the infants with Down syndrome did less looking and demonstrated poor turn-taking. Goldberg (1977) proposed that the unpredictable, unreadable, or unresponsive infant has the potential for trapping a parent in cycles of ineffective interaction, even though the parent may be initially responsive and motivated. This has implications for intervening with both the infant and the parent.

Components of Intervention for Children with Communication Delays

This review of how social-communicative behaviors are normally acquired suggests that the following features should be incorporated in interventions with children whose communication behaviors are delayed:

1. The parent or caregiver functions as the primary intervention agent.
2. Intervention takes place through routines and games within the natural context.
3. Intervention takes advantage of natural contingencies.

Although these features are consistent with strategies that are being recommended by many leaders in the field (Bricker & Schiefelbusch, 1984; Dunst, 1981; MacDonald, 1985), have received clinical backing, and were pilot tested in the program in which this study was based, their effectiveness has not been empirically validated.

Parent-implemented intervention. The parent (or caregiver) is an obvious choice for the primary intervention agent. The parent is naturally motivated to interact with the infant, and is typically the child's first social

partner. Further, infants spend most of their time with the parent. Thus, the parent can provide multiple learning opportunities throughout the day. There are several models for involving parents in early intervention with infants. Infant workers have designed interventions to help mothers read their infant's signals and respond more contingently. Field (1977, 1980) designed two strategies to "slow down" mothers who dominated exchanges with their high-risk infants by having mothers imitate the infant's behavior and repeat what they say to their infants. Another approach to enhance successful interaction has been to teach mothers specific games to play with their infants (Field, 1979; Badger, 1977; Sparling & Lewis, 1981).

An alternative approach has been to have parents assume the teaching role in one-on-one skill building. Hanson (1976) designed a parent-implemented intervention program for infants with Down syndrome. Motor and adaptive skills were task analyzed. Parents used shaping procedures to successfully teach these skills to their infants. In a subsequent report, Hanson (1979) used these same procedures to teach a variety of developmental skills including such communicative behaviors as "shows or offers toys," and "indicates wants by gestures." Filler and Kasari (1981) demonstrated that similiar parent- implemented strategies were successful with two severely handicapped infants. The parents successfully taught motor and perceptual skills.

Notable in the language training area, MacDonald, Blott, Gordon, Spiegel and Hartmann (1974) designed a training program for parents of language delayed children. Pre- to post-test gains showed that children whose parents had received training made larger gains than a control group. Mahoney and Snow (1984) reported that parents successfully implemented a language intervention program for young children with Down syndrome. A similiar approach was suggested for prelinguistic children.

Intervention within the natural context. There are strong arguments to support teaching early communicative behaviors within the natural context, and particularly within infant-caregiver play activities. These activities (rituals, games, caregiving routines) offer an ideal context for teaching and practicing communicative skills. It has been noted that the topics and context of most early communicative exchanges revolve around these familiar play activities, objects, and other environmental cues (Mahoney & Weller, 1980). Social play activities facilitate the acquisition of communicative competence through opportunities for the child to actively participate and experiment; and through the mutual reinforcement both infant and parent provide each other.

At least three important features of infant-parent social play activities have implications for communication development. First, the semantic content of tne play routine is familiar and highly restricted. The routines focus on objects, people, and events which are within the infant's view and experience. Second, these activities have a predictable and clear-cut sequence. For example, when requesting re-activation of a wind-up toy, the sequence might be: mother winds up the toy, infant watches as toy winds down, infant takes toy, infant gives toy to mother while vocalizing, mother takes the toy, comments, and winds up the toy. The game continues in this manner. Through repetition of this sequence, the infant learns to anticipate outcomes and is able to make the appropriate action at a point in the sequence. The third feature of these routines, games, and rituals, is the clear definition and often reversible nature of role structures. For example, in the book reading activity (a point-and-name game), baby may point at a picture while the mother names objects, or the roles may be reversed. In this way the infant has an opportunity to experience a role variation within a familiar context.

Routines, games, and rituals play an important role in the development of social-communicative behaviors by normal infants. Dunst (1981) proposed that interventions that systematically incorporate social activities can be effective in promoting attainment of social-communicative behaviors by handicapped children. He based this on his clinical experience as well as research on teaching sensorimotor behaviors. The research reported here provides an emerging data base for the use of routines and games in facilitating the acquisition of social-communicative behaviors by handicapped infants.

Natural contingencies. The third feature of the interventions used with children having communication delays is the use of natural contingencies. When the child produces a target behavior, the parent attempts to maintain or increase that behavior by providing positive reinforcement. There are a variety of consequences that might be considered when identifying positive reinforcers. The most natural reinforcers of communicative behaviors are those that simulate the desired effect of communication in most environments. These effects are social interaction, participation in desired activities, or obtaining desired objects or information. That is, the individual successfully communicates and obtains a desired social or tangible end. Natural contingencies have become more important as researchers have struggled with the problem of generalization in language training programs. Often what is taught and mastered in language training sessions is not used in other situations (Spradlin & Siegel, 1982). It has been suggested that the use of natural contingencies may alleviate this problem (Stokes & Baer, 1977). By following the child's communicative attempts with attention, desired objects, or services which are linked to the child's intent, the parent teaches the child that these communicative behaviors are effective.

In this investigation, the use of natural contingencies was fostered through the selection of the setting and the agents who implemented the intervention. First, the intervention took place in the home, which encouraged natural rather than contrived consequences. Second, parents were taught to identify their infant's communicative behaviors and to respond to them in a meaningful way.

Method

Design

The project was conducted as two studies, both employing single subject, repeated measurements designs. In both studies, the particular design used was the multiple baseline across subjects design. In the first study there were 3 subjects, and in the second study there were 6 subjects.

Study 1

Subjects

Three developmentally delayed, male infants and their mothers served as subjects. Subjects ranged in age from 12 to 16 months of age. Their performance on the Mental Scale of the Bayley Scales of Infant Development (Bayley, 1969) ranged from 69-86. The Ordinal Scales of Psychological Development (Uzgiris & Hunt, 1975) were administered at the beginning of the study. All subjects were functioning at Stage IV. All subjects were from English-speaking middle class homes.

Setting and Stimuli

A standard set of toy-types was used during data collection. A set of toys included a ball, a bottle of bubbles, a doll, a container and small objects, a wind-up toy, a book, and a cloth. The parent was free to add other toys to the play setting.

An initial tape was made in the living room of the family's home. Subsequent taping and data collection were done in the infant classroom at the University of Washington. Parent training was also conducted in the infant classroom.

Procedure

Baseline. During baseline procedures (and during the home taping), the mother was given instructions to play with her child as she normally would at home. A set of toys was available. Taping continued for 10 minutes (30 minutes for home tapes).

Training. On the first day of training, the mother was given a verbal and written description of her infant's target behaior. Then the mother and parent trainer watched a videotape of examples of the target behavior. Next, the mother watched a 10-item videotaped identification test of examples and non-examples of the target behavior. The mother was required to correctly identify at least 9 of 10 of the items before this training session concluded. Then a 10-minute taping session was conducted. For the next 2 weeks, during training sessions, the mother was reminded of the target behavior, and encouraged to try to elicit it. The 10-minute taping sessions were continued weekly.

Following this phase of intervention, the mother was introduced to the intervention strategy. She was instructed to follow the child's lead,

establish turn-taking, and elaborate on the child's behavior (see Appendix A). The parent trainer and the mother viewed segments of previous videotapes together. The parent trainer used specific examples to coach and provide feedback to the mother. Then the trainer modeled the strategies with the child. The trainer used toys from the toy sets. The 10-minute taping sessions followed. In subsequent sessions, the parent trainer and mother reviewed the strategies, and viewed videotape segments. The trainer continued to provide feedback to the mother.

Maintenance and Follow-up Assessments

Upon completion of the intervention, weekly sessions to the center continued. The structured coaching and feedback while viewing videotapes did not occur. Six weeks after the end of intervention a follow-up videotape was made.

Results

Mother and infant data were analyzed through examination of graphs showing the frequency of the various behavior categories for each participant.

Infant Behaviors

Figure 1 shows the frequency of occurrence of the target social-communicative behavior for each subject. These behaviors were coded using the Communicative Intention Inventory (Coggins & Carpenter, 1981) (see Appendix B). For each of these 3 subjects the target was to increase the frequency of requesting and commenting behaviors. These graphs show that both subjects A and C increased their production of requesting and commenting

behaviors. These infants continued to display these behaviors at the 6 week follow-up. Subject B showed a very low level of the target behavior during baseline and the first phase of intervention. He did produce the targets somewhat more frequently during intervention. Using 3 instances as a minimal level of production per session, he did not reach this level until the follow-up session.

Mother Behavior

In the first study, a measure of following the child's lead was used to determine changes in mother's behavior with the onset of the intervention phase. Turn-taking episodes betwen mother and infant were coded as initiated by mother or initiated by infant. Shown in figure 2, are the percentage of turn-taking episodes initiated by the infant per session. An important element of the intervention was to increase the infant's proportion of initiations to at least 50 percent. These data show that subject A's percentage of initiations increased following intervention. Although there was some decrease midway through the intervention, his percentages remained at or above 50 percent. Subject B's percentage of initiations also increased following intervention, but fell off again midway thorgh the intervention. Subject C's data show a marked increase following intervention. This increased level of initiation was maintained.

While the data presented in figure 2 are for the infants, the changes were mediated by their mothers. That is, for the infant's percentage of initiations to increase, the mother had to decrease her own initiations by waiting for the infant to behave and following the infant's signal however subtle it may have been.

Discussion

This study suggested four changes which were implemented in the second study. First, the first phase of intervention was dropped. Intervention with Subjects A and B showed that this phase of intervention (identifying the target bheavior and encouraging mother to elicit the target behavior) resulted in an increase in directives given by the mother. That is, the mother took on a didactic role. Since the overriding objective of the intervention was to increase the children's social communication skills within balanced, turn-taking episodes, the decision was made to drop this phase which had instead unbalanced the mother-child episodes.

Second, it was decided to add a follow-up session to the study. This entailed a 10-minute taping done 6 weeks following the end of intervention. This decision was made in sufficient time to add this to Study 1.

Third, after approximately half of the taping sessions, a set of 6 elicitation tasks was presented to each subject by the experimenter. These tasks drawn from Bruder (1984); Dale (1980); and Snyder (1978) were used to look at the relationship of the children's production of requests and comments in a structured setting as well as in the free-play setting. (See Appendix C for the tasks and coding scheme.)

Fourth, the home taping session was dropped. It was found during the pilot study that the dyads showed similar behaviors at home and in the classroom.

Study 2

Subjects

Six developmentally delayed infants and their mothers (or father) participated in this study. Five of the infants were diagnosed as Down syndrome. The sixth child had a rare chromosomal defect. There were 4 girls and 2 boys. The children ranged in age from 12 months to 25 months. Their performance on the Mental Scale of the Bayley Scales of Infant Development (Bayley, 1969) ranged from 50 to 72. On the Ordinal Scales of Psychological Development (Uzgiris & Hunt, 1975), subject 1 was functioning at Stage III-IV. Subjects 2, 3, and 4 were functioning at Stage IV.. Subject 5 was functioning at Stage III. Subject 6 was functioning at Stage V.

Five of the subjects participated with their mothers. Subject 2 participated with her father who was the primary caregiver. However, this dyad dropped out of the study after 4 weeks of intervention due to unforeseen changes in the father's work schedule. A sixth pair was then added late in the study.

Setting and Stimuli

The toy sets used in study 1 were used in the second study as well. Taping, data collection, and parent training sessions were conducted in the infant classroom at the University of Washington.

Procedure

Baseline. Data collection during baseline conditions was conducted similarly to the first study. The parent was asked to play with their infant as they normally would at home. The parents had been informed that the purpose

of the study was to look at young children's early developing communication skills.

Training. On the first day of training the parent was given a verbal and written description of the goal of the intervention, and the strategies to be used. These written descriptions are found in Appendix A. In this and subsequent training sessions, the parent and parent trainer viewed videotaped segments of previous sessions together. The trainer reviewed the strategies with the parent, and provided feedback. Then the trainer modeled the strategies with the child. The 10-minute taping session followed. The trainer provided feedback to the parent at the end of the session.

Maintenance and Follow-up

After completion of the structured intervention, weekly sessions of therapy and education continued at the center. Six weeks following the end of the intervention a follow-up tape was made. This was a 10-minute session using the same toys and procedures as in previous sessions.

Results

As before, parent and infant data were analyzed through examination of graphs showing the frequency of the various behavior categories for each participant.

Infant Behaviors

Figure 3 shows the frequency of occurrence of the targeted social-communicative behaviors for each of the 6 infants. The target was to increase frequency of production of requests and comments. Once again, the

Communicative Intention Inventory (Coggins & Carpenter, 1981) was used to code the videotaped sessions. The graphs show that for subject 1 production of the target behaviors increased during intervention, but level of production was variable. Subject 2 also showed a marked increase in production of the target behaviors during the intervention phase. Subject 3 also showed an increase in her production of the target behaviors, although her level of production remained relatively low. Subject 5 also demonstrated an increase in production of requests and comments following intervention. Inspection of this child's baseline graph suggests that these behaviors were in his repertoire but were not regularly enhanced prior to the intervention phase. Subject 6 also showed an increase in production of requests and comments. However, the intervention did not result in changes in the production of requests and comments by subject 4. All subjects (except subject 2 who dropped out of the study) showed an increase in production level at the follow-up session relative to their baseline levels.

The infants performance on the elicitation tasks are shown in Table 1. The infants' response to these tasks were coded according to Bruder (1984) and Dale's (1980) modification of Snyder's (1978) original coding scheme (see Appendix C). These data were collapsed to show typical (or modal) level of performance during baseline and intervention, and optimal (or most sophisticated) level of performance during baseline and intervention. Optimal performance is also shown from the follow-up session. These data show that for those tasks designed to elicit comments, only 1 infant (subject 6) changed her typical level of performance, and 3 infants increased their optimal level of performance. One child (subject 4) decreased his optimal level of performance. For those tasks designed to elicit requests, one infant (subject 5) increased his typical level of performance and 3 infants increased their optimal level of performance.

Parent Behavior. In the first study, a relatively crude measure of following the child's lead was used. In the second study, we counted frequency of occurrences of the parent imitating the child. This strategy was taught during the intervention as a quick way of interacting at the child's level. Imitation data are presented in Figure 4.

These graphs show that parent 1 markedly increased her use of imitation following intervention. Parents 2 and 3 also showed substantial changes in use of imitation following intervention. However, parent 4 showed much variability in her use of imitation in both baseline and intervention phases. Parent 5's graph shows much variability in her use of imitation during baseline, but high, stable use of this strategy during intervention. Parent 6 showed increased use of the imitation strategy during the intervention phase.

These data demonstrate that 5 of 6 of the parents in the second study learned and used the imitation strategy. This strategy was a relatively quick, straightforward way of teaching the parent to play and communicate at the infant's own level. The infant was allowed the opportunity to behave. The parent then made this a meaningful initiation by imitating the infant.

Parent 4 in the study did not use this strategy. Note that Infant 4 also did not demonstrate changes in his production of requests and comments. All other parents in this second study did use the imitation straegy. Their infants did increase their production levels of the target behavior.

Discussion

The purpose of this research project was to validate a parent-implemented intervention to increase use of selected prelinguistic communication skills by their young developmentally delayed children. Both theory and research

support the educational advantages of parent-implemented interventions. The parent component is particularly critical with very young children. The parent is the child's partner in a multitude of learning opportunities. This project took advantage of this partnership by teaching particular strategies to the parents to enhance particular skills.

The skills which were the focus of the intervention were requesting and commenting. These are social-communicative skills in which the user initiates the interaction. Our review of normal communication development during the early months of life showed that these skills develop within dynamic social interactions between a child and competent, available speakers, usually parents. The studies reported here used this interactional approach.

The present studies demonstrated, at a preliminary level, the utility of a parent-implemented interactional approach by showing its applicability in working with parents of young developmentally delayed children. The results, though not unequivocal, showed changes in the behavior of 8 of 9 parents. There were corresponding change in the behavior of 7 of the 9 infants.

These studies addressed two questions. Was the training procedure effective in increasing parents use of the intervention strategy was the first question. The data show that for 8 of 9 of the parents, changes in the expected direction were shown. However, one parent in the second study did not achieve a stable rate in her use of the strategy. Another parent (of subject B) showed initial changes but did not maintain her use of the strategy. This suggests that for these parents use of the strategy was not sufficiently reinforced to maintain its use.

The offspring (Subject B and Subject 4) of the two parents who had difficulty with the intervention strategy showed minimal changes in their behavior as well. This helps answer the second question. Did the

parent-implemented intervention produce increases in the social-communicative behaviors of the children? The data reported so far, show that for those children whose parents used the strategy, increases in requesting and commenting were demonstrated.

Because the expected effects were not replicated across all dyads in these studies, the need remains for more research. This research should focus on a more careful delineation of the intervention strategy, and a determination of which parents and/or children are the appropriate participants in this type of intervention.

The data from these two studies continue to be analyzed. Measurement of the training effects will be assessed at multiple levels.

Future Activities

The raw data from this project are in the form of videotapes. Thus, these data can be subjected to further analysis. Some of the activities described in this section are in progress, while others are in the planning stages. The results of these analyses will be shared with readers upon request.

A major project is transcribing the videotapes. This is a time-consuming project. When completed, the transcripts will be coded for turns, types of turns, number of turns on topic and so forth. This will get at the second part of the intervention strategy - establishing turn-taking. These transcripts will also be used to code parent's use of elaboration, which was the third component of the intervention.

Another major activity will be a more fine-grained analysis of the subject's social-communicative behaviors. These have been coded as gestural, vocal or both. These will be graphed separately to look for changes over

time. We are particularly interested in eye contact, or looking, as a meaningful gesture.

Next, we will look at the games and activities which the parents were encouraged to use. We will want to see if certain games/activities are associated with increased use of social-communicative behaviors, more balanced turn-taking, or increased number of turns on a topic.

Finally, as part of this research project a videotape was made to use on the initial day of parent training. We are now in the process of making a better quality videotape which will be used with parents and early childhood/special education professionals.

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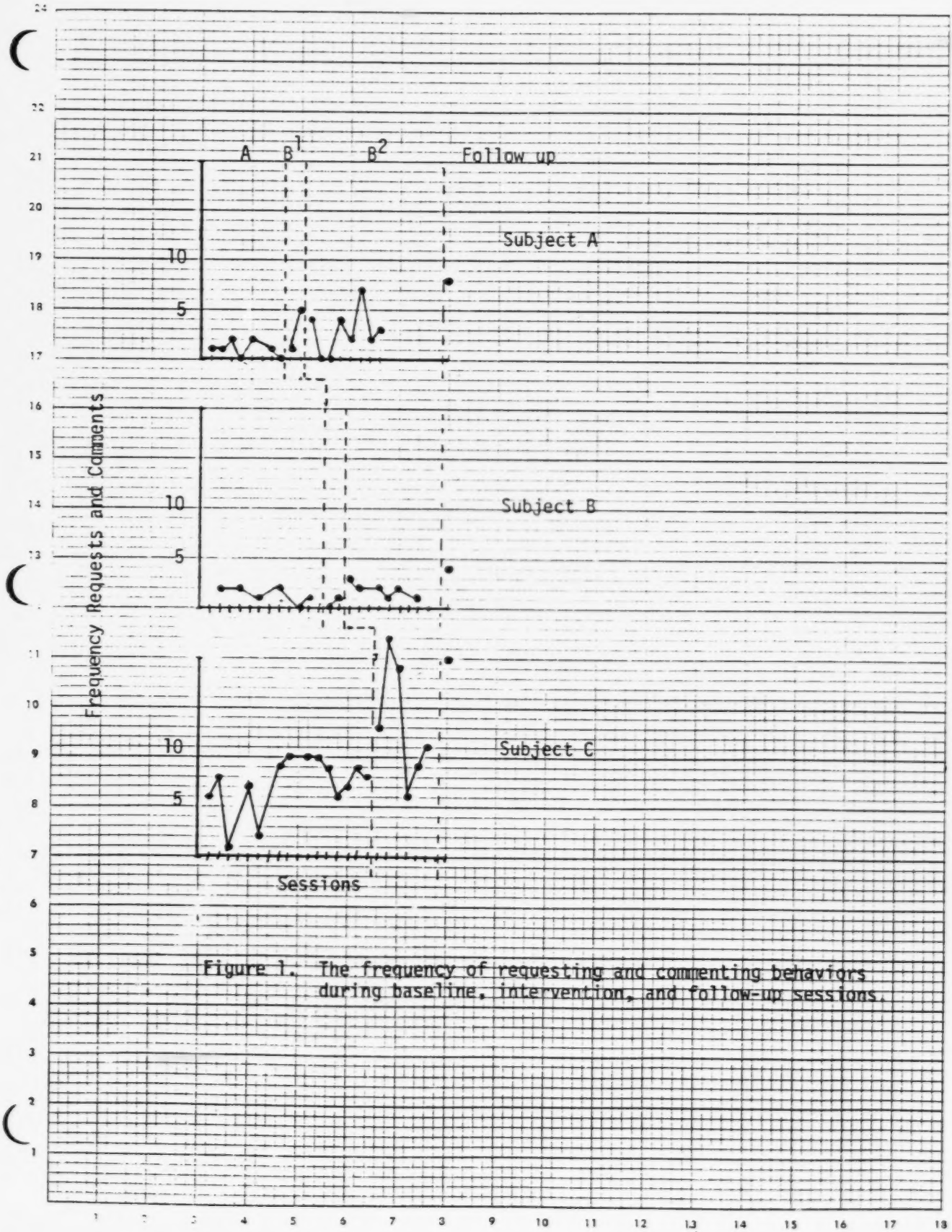

Figure 1. The frequency of requesting and commenting behaviors during baseline, intervention, and follow-up sessions.

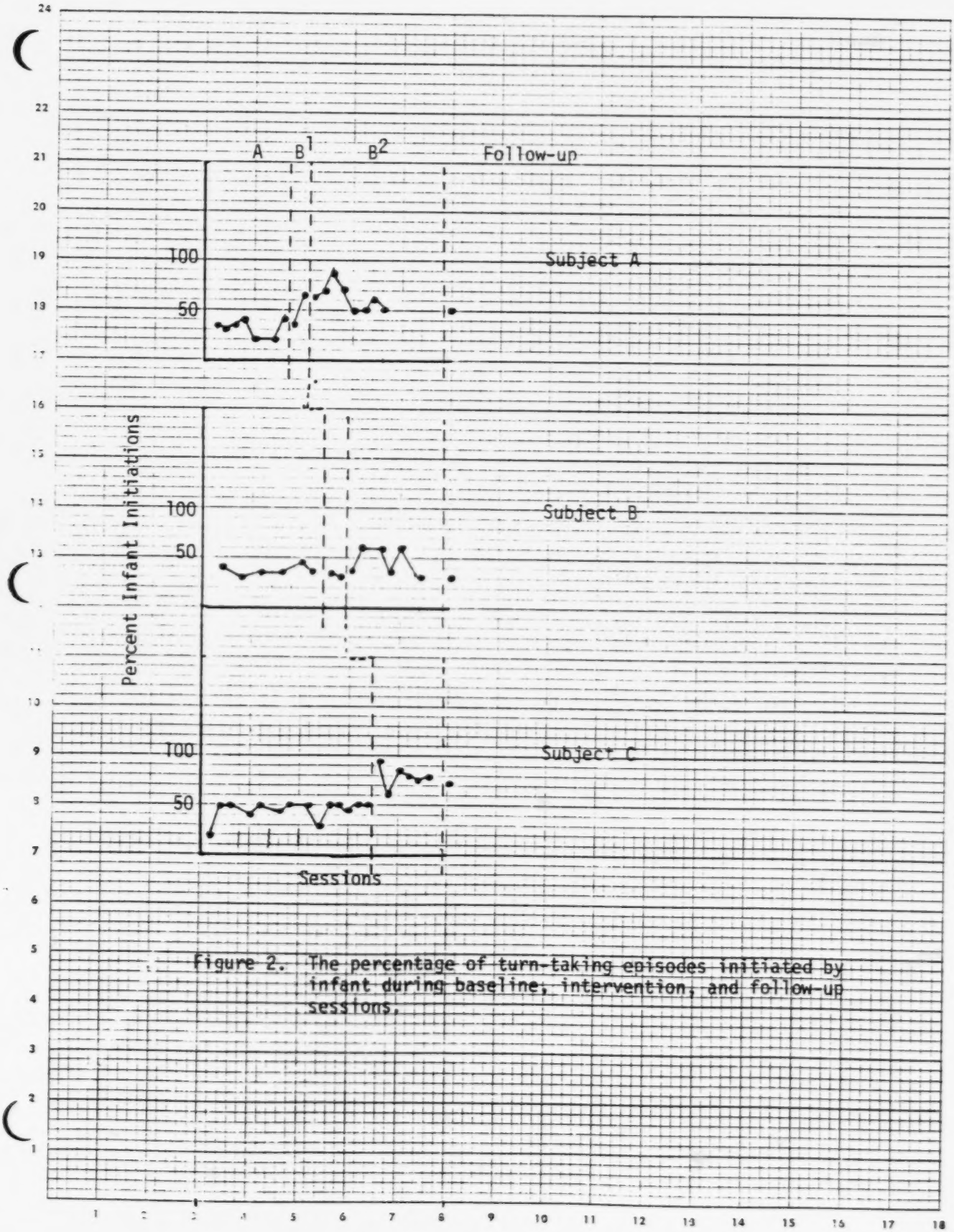

Figure 2. The percentage of turn-taking episodes initiated by infant during baseline, intervention, and follow-up sessions.

Table 1

Response of Infants to
Elicitation Tasks During Baseline
Intervention and Follow-up Phases

	Comment					Request				
	Baseline		Intervention		Follow-up	Baseline		Intervention		Follow-up
	T	O	T	O	O	T	O	T	O	O
Subject 1	0	0	0	4	4	1	2	1	4	4
Subject 2	0	1	0	1	-	1	3	1	4	-
Subject 3	0	1	0	3	1	1	3	1	3	3
Subject 4	0	4	0	3	1	1	4	1	4	3
Subject 5	0	1	0	4	1	1	4	2	4	4
Subject 6	1	4	4	4	3	2	3	2	4	4

T = Typical

O = Optimal

Scores

0 = no notice or no response

5 = most sophisticated response

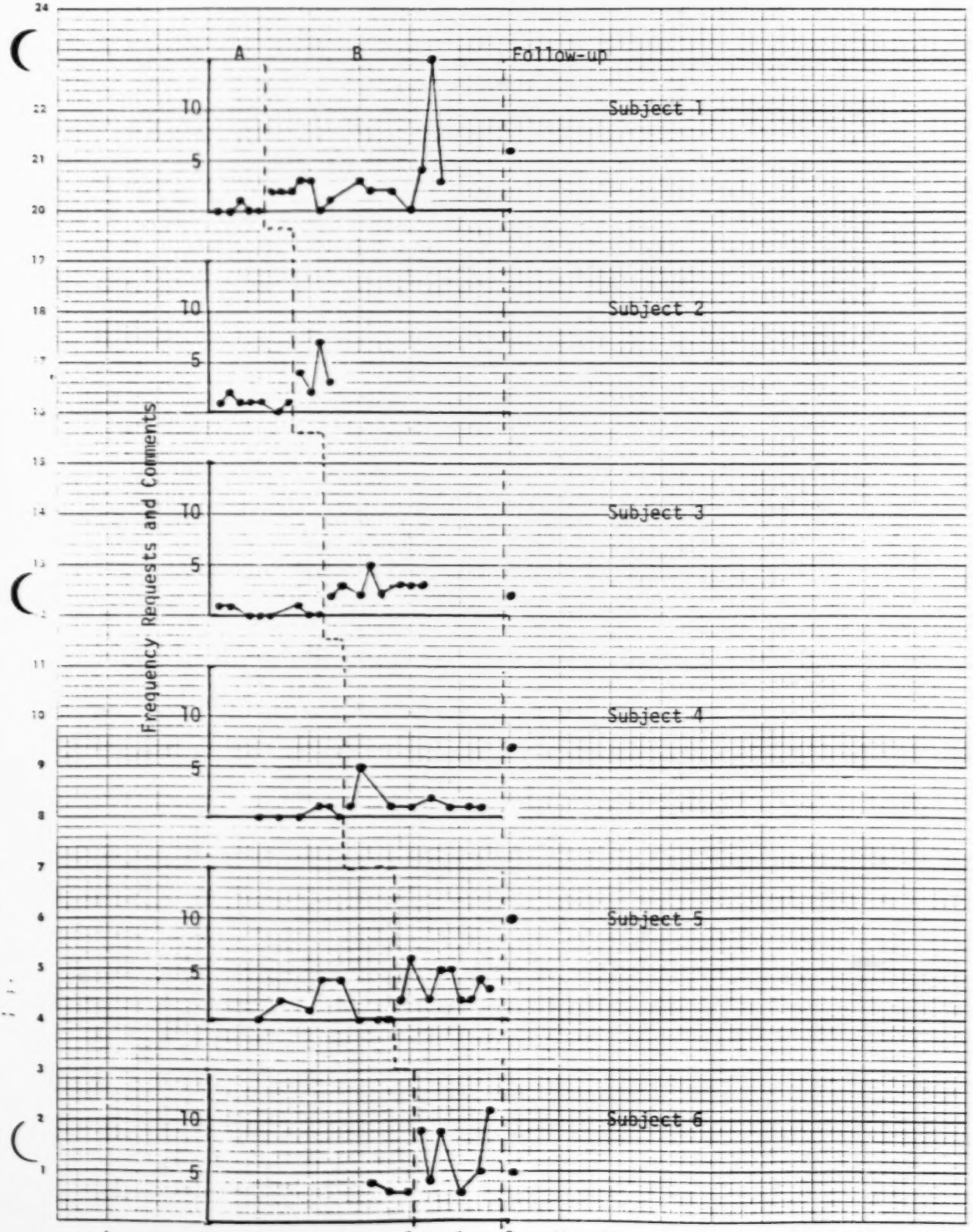

Figure 3. The frequency of requesting and commenting behaviors during baseline, intervention, and follow-up sessions.

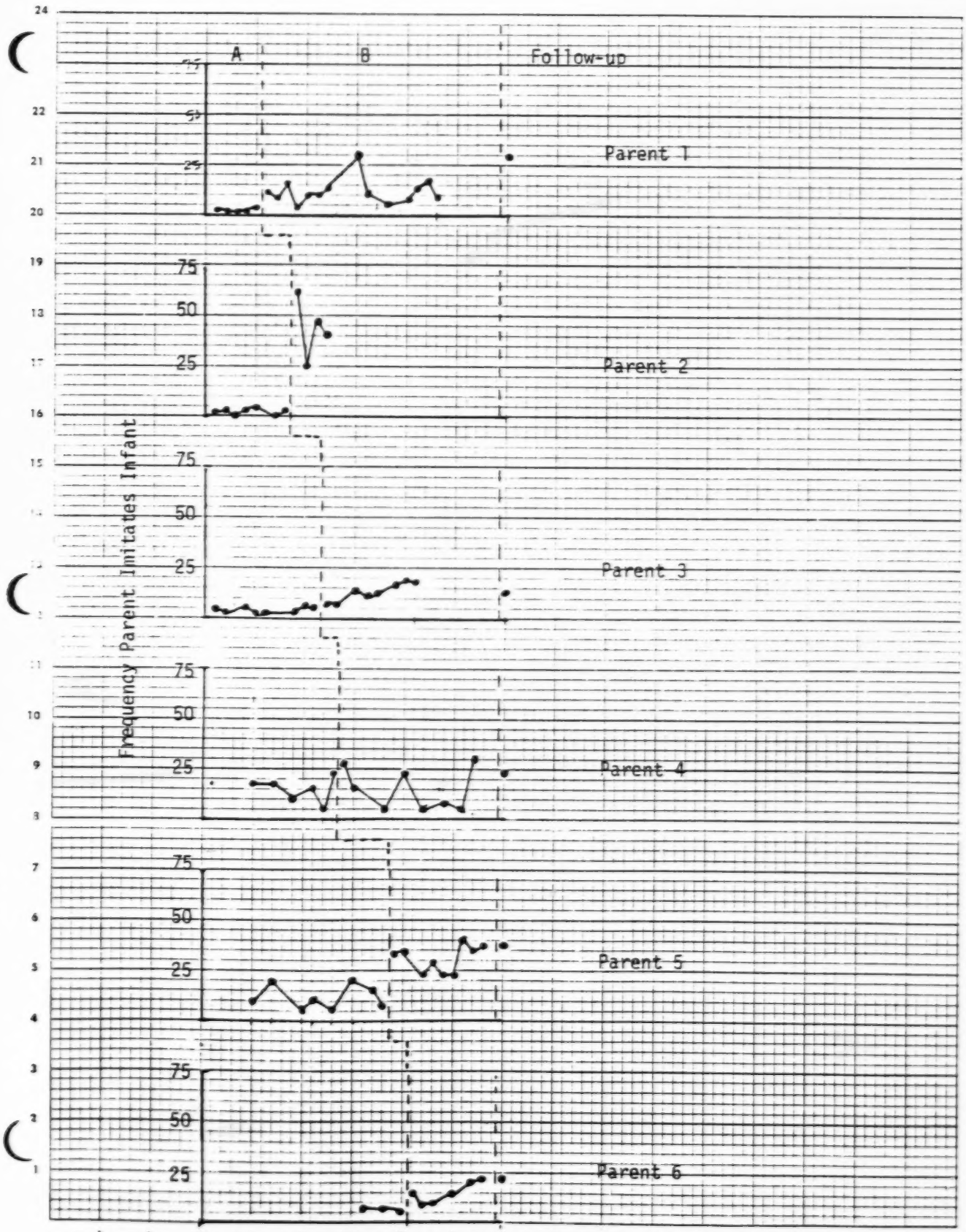

Figure 4. The frequency of parent imitations of infant during baseline, intervention, and follow-up sessions.

STRATEGIES

As a way of helping your child communicate more intentionally, we'd like you to use the following 3 strategies. These strategies take a conversational approach. We'll use the playful, back and forth nature of games to move towards conversation with words.

1. Follow your child's lead

Watch. See what your child is interested in. Make that into a meaningful exchange. Now you are sharing an activity and the stage is set for conversation.

2. Take turns

This strategy emphasizes the back and forth nature of shared play and eventually conversation. Try to get the activity or conversation to continue for several turns.

3. Elaborate

Now you and your child are sharing an activity or topic and taking turns. Add one new element to your turn as a way of getting your child closer to his/her communication goal. For example, when your child points to the ball, you can take your turn by pointing to the ball and saying "ball."

GAMES

These are the games we'd like you to use to encourage turn-taking and more sophisticated communication skills. Try to use some of these games everyday. But, also incorporate the "strategies" into other games and routines. If you need any of the toys or materials, please let us know.

1. BALL

This is simmply the game of rolling a ball back and forth with your child. After you've taken a few turns, try waiting before you roll the ball back. See if your child "asks" for the ball. Take some more turns, then try waiting again.

2. BUBBLES

This game uses soap bubbles and a wand. Blow some bubbles. Let baby take his turn by looking, or pointing, or popping the bubbles. Then blow some more bubbles. After taking a few turns, try waiting before you blow more bubbles. Baby can "ask" for more bubbles. After baby watches, or points at the bubbles, show him how to "comment." Say "pop" or "oooh."

3. WIND-UP TOYS

This game uses any big or small wind-up toy. Wind-up the toy. Baby takes his turn by looking, pointing, or reaching towards the toy. When the toy winds down, wind it up again. After a few turns, wait before you wind it up.

Let baby "ask" you to wind it up again. After baby looks at, or points at the toy, you can also demonstrate "commenting" by pointing and naming the toy or action.

4. CONTAINER PLAY

This game uses any container (can, box, cup) and a handful of small objects (blocks, peg people, beads). Let baby have the container. Hand him the small objects one at a time to put in the container. After a few turns, wait before you give him the next one. Let him "ask" for another one. Take a few more turns. Also try giving him unexpected. For example, after he's put several blocks in the cup, give him the brush.

5. PEEK-A-BOO GAMES

This game involves taking turns hiding and finding toys. In a simple form you might drop a cloth over a doll and say "Where's the baby?" Then you child takes his turn by uncovering the doll. After a few turns, do something unexpected. Try substituting a different toy under the cloth. Does baby "comment" on the change?

6. BOOK READING

This game involves pointing and naming the pictures in a book. In its usual form, the adult points and says "Look," and the baby looks at the picture. Then the adult says "What's that?" and baby looks, names or points. Then the adult names the picture. And they go on to the next page.

COMMUNICATIVE INTENTION INVENTORY

Truman E. Coggins & Robert L. Carpenter

COMMENT ON ACTION: Direction of the listener's attention to some observable referent. An intentional behavior that appears to call the listener's attention to the movement of some object rather than the object per se.

Gestural or Gestural-Vocal	Frequency Tally
a. Looks at an entity in action; points toward an entity in action; or is involved with an entity in action; may vocalize.	
Verbal	
a. Looks at an entity in action; or points toward an entity in action; or is involved with an entity in action and produces word.	

COMMENT ON OBJECT: Direction of the listener's attention to some observable referent. An intentional behavior that appears to call the listener's attention to some object identified by the child.

Gestural or Gestural-Vocal	Frequency Tally
a. Extends arm to show entity already in hand; may vocalize.	
b. Picks-up an entity and immediately shows it to adult; may vocalize.	𝍸
c. Points to, looks toward or approaches entity; may vocalize.	
Verbal	
a. Extends arm to show entity in hand and produces a word.	
b. Picks-up entity and immediately shows it to adult and produces a word.	
c. Points to, looks toward or approaches entity and produces word or word combination.	
d. Produces a word or word combination that refers to an entity not existent in the immediate environment (generally the word/word combination will either have, or require a form of the copula or the word have).	

REQUEST FOR ACTION: Solicitation of services from a listener where child awaits a response. An intentional behavior that directs the listener to act upon some object in order to make the object move. The child's interest appears to be in the action of the object rather than in the object per se.

Gestural or Gestural-Vocal	Frequency Tally
a. Looks at entity that has ceased moving, has the potential to move or be moved; reaches or leans toward entity; may fuss or whine.	1
b. Looks toward entity that has ceased moving, has the potential to move or be moved; and makes ritual gesture.	
Verbal	
a. Looks toward entity that has ceased moving, has the potential to move or be moved; may point toward entity or adult; may give entity to adult and produce word or word combination (e.g., turn, go, choo-choo, open it, you do it).	

REQUEST FOR OBJECT: Solicitation of services from a listener where child awaits a response. An intentional behavior that directs the listener to provide some object for the child; the object is usually out of reach due to some physical or spatial barrier.

Gestural or Gestural-Vocal	Frequency Tally
a. Stretches hand toward entity; whines or fusses while leaning toward the entity.	1
b. Stretches hand toward entity with ritual gesture; may vocalize.	
Verbal	
a. Looks at or touches entity; points to or reaches toward entity and produces word(s) (e.g., bubbles, more, dog, up).	
b. Produces a word or word combination that directs the listener to furnish entity not existent in immediate environment.	

REQUEST FOR INFORMATION: Solicitation of services from a listener where child awaits a response. An intentional behavior that directs the listener to provide information about an object, action or location.

Gestural or Gestural-Vocal	Frequency Tally
a. Looks at and/or points toward an entity, movement or location; picks up or touches entity; may vocalize (possibly accompanied by rising intonation).	
Verbal	
a. Looks at adult and requests additional input about a referent; gesture may accompany request (generally a wh-word initiates the request); possibly accompanied by rising intonation.	

ANSWERING: Responding to a request for information with the semantically appropriate data.

Gestural or Gestural-Vocal	Frequency Tally
a. Responds to adult's query with affirmative head nod; may vocalize.	
b. Responds to adult's query with negative head nod; may vocalize.	
c. Provides obligatory gestural response to adult's query where the answer is visually apparent in the immediate environment; may vocalize.	
d. Provides gestural response to adult query where the answer is not apparent in the immediate environment; may vocalize.	
Verbal	
a. Responds to adult's query with affirmative verbal response; may imitate part of adult's preceding question.	
b. Responds to adult's query with negative verbal response; may imitate part of adult's preceding question.	
c. Provides a verbal response to adult query where the answer is visually apparent in the immediate environment; may imitate part of adult's preceding question.	
d. Provides a verbal response to the adult query where the answer is not apparent in the immediate environment; may repeat part of adult's preceding question.	

ACKNOWLEDGING: Providing notice that a previous gesture or utterance was received.

Gestural or Gestural-Vocal	Frequency Tally
a. Child spontaneously imitates the immediately preceding adult gesture and/or vocalization and awaits response.	
b. Child nods his head to agree or disagree with the adult's immediately preceding action request (e.g., Can you give me a kiss?) or attention request (e.g., Did you hear me?).	
Verbal	
a. Child spontaneously imitates the immediately preceding adult utterance and awaits response. Child does not add any new information or modify word order.	
b. Child verbally agrees (e.g., o.k., yeah that's right) with the adult's immediately preceding action request (e.g., Shall we draw daddy?) or attention request (Do you see him?).	

PROTESTING: Expressing disapproval of the speaker's action or utterance.

Gestural or Gestural-Vocal	Frequency Tally
a. Adult initiates an activity (other than a question) that the child rejects or declines to perform. Child may turn away from adult; may fuss (brief or prolonged); may push adult's hand away or strike out at adult; may scream or vocalize.	
b. Adult initiates an activity (other than a question) that the child rejects or declines to perform. Child uses ritualized gesture to indicate disapproval or disagreement (e.g., shaking head from side to side); may vocalize.	||||
Verbal	
a. Adult initiates an activity (other than a question) that the child rejects or declines to perform. Child may shake head from side to side or push adult's hand aside; says word(s).	

Appendix C

TASKS

Requests/Imperatives

1. Give child small stuffed animal. Hold baby blanket, baby hat, and feeding bottle.
2. Give child a block. Hold pail filled with blocks.
3. Give child part of telephone. Hold receiver.
4. Windup airplane. Put on surface to run down.
5. Give child an empty plate. Hold clear plastic bag filled with cheerios.
6. Give child one car. Hold an open box of cars.
7. Give child a drumstick. Hold a drum.
8. Give child clear plastic jar of cookies which child cannot open. Stay near child.
9. Place toy truck near child. Place hand on it.
10. Give child clear plastic box of toys which child cannot open. Stay near child.

TASKS

Comments/Declaratives

1. Child drops 3 blocks into pail. (May assist.) Then offer doll.
2. Roll 3 balls to child. Then roll baby bottle.
3. Hit xylophone with stick 3 times. Then offer spoon.
4. Roll car to child 3 times. Then roll ball.
5. Push toy car on surface 3 times. Then place toy pig on wheels on surface.
6. Hold box. Take out 3 balls. Then take out ring of keys.
7. Blow up balloon. Let air out.
8. Shake bells. Stop. Turn on music box out-of-sight.
9. Model feeding small stuffed dog with spoon. Child feeds dog 3 spoonfuls. (May assist.) Then give child baby bottle.

CODING SCHEME

Request/Imperative

Score	Behavioral Description
0	No response to needed object or agent.
1	a. Child looks at adult. b. Child looks at object. c. Child removes adult's fingers.
2	a. Child looks at adult and fusses or vocalizes. b. Child extends arm toward object, or reaches, or points, and fusses or vocalizes. c. Child looks at and reaches for adult's hand. d. Child removes adult's fingers and fusses or vocalizes.
3	a. Child points to and/or reaches for the object and then looks at adult. b. Child points to and/or reaches for the object and then looks at adult's hand. c. Child gives object to adult without eye contact but does vocalize.
4	a. Child gets adult's attention then points to or reaches for object. b. Child gives object to adult and makes eye contact, may vocalize.
5	a. Child uses a word to express desire for object or action.

Comment/Declarative

Score	Behavioral Description
0	No or minimal notice of newness (score presupposition).
1	a. Child looks at adult. b. Child physically manipulates adult to get attention.
2	Child "shows off" to get adult's attention (child attention not focused on adult or object).
3	a. Child shows or gives object to adult to get adult to attend. b. Child points to object to get adult to attend.
4	a. Child shows, gives or points to adult and vocalizes. b. Child examines object and vocalizes.
5	Child uses word to get adult to attend to object.

Presupposition (use to refine score of comment/ declarative if that score is 0 or 1)

Score	Behavioral Description
0	No apparent notice of newness.
1	a. Child looks at object for at least 2 seconds. b. Child performs new action with object.
2	Child attempts to communicate newness to adult.